

WHAT IS CLAIMED IS:

- 1 1. A process for the preparation of a dialkyl peroxide comprising  
2 reacting one or more members selected from the group consisting of an  
3 alkylating alcohol of the formula ROH, and an olefin of the formula  
4  $(R^2)(R^{2a})C=C(R^3)(R^{3a})$ , wherein R is C<sub>1</sub>-C<sub>10</sub> alkyl, and R<sup>2</sup>, R<sup>2a</sup>, R<sup>3</sup>, and R<sup>3a</sup>  
5 are independently selected from hydrogen and C<sub>1</sub>-C<sub>10</sub> alkyl; with a  
6 hydroperoxide of the formula R<sup>1</sup>OOH, wherein R<sup>1</sup> is C<sub>1</sub>-C<sub>10</sub> alkyl; in the  
7 presence of an effective amount of a substantially solid, insoluble,  
8 heterogenous acidic catalyst; followed by separation of the reaction mixture  
9 from said catalyst.
- 1 2. A process according to Claim 1 for the preparation of di-*tert*-butyl  
2 peroxide comprising reacting one or more members selected from the group  
3 consisting of *tert*-butyl alcohol and *iso*-butylene; with *tert*-butyl  
4 hydroperoxide; in the presence of an effective amount of a substantially  
5 solid, insoluble, heterogenous acid catalyst.
- 1 3. A process according to Claim 1 for the preparation of di-*tert*-amyl  
2 peroxide comprising reacting one or more members selected from the group  
3 consisting of *tert*-amyl alcohol and *tert*-amylene; with *tert*-amyl  
4 hydroperoxide; in the presence of an effective amount of a substantially  
5 solid, insoluble, heterogenous acid catalyst.
- 6 4. A process according to Claim 1 wherein said substantially solid,  
7 insoluble, heterogenous acid catalyst comprises an at least 10% cross-linked  
8 ion exchange resin catalyst.

1 5. A process according to Claim 2 wherein said substantially solid,  
2 insoluble, heterogenous acid catalyst comprises an at least 10% cross-linked  
3 ion exchange resin catalyst.

1 6. A process according to Claim 3 wherein said substantially solid,  
2 insoluble, heterogenous acid catalyst comprises an at least 10% cross-linked  
3 ion exchange resin catalyst.

1 7. A process according to Claim 1 wherein said substantially solid,  
2 insoluble, heterogenous acid catalyst is an at least 20% cross-linked  
3 polystyrene-divinyl benzene acidic resin catalyst.

1 8. A process for the preparation of a dialkyl peroxide comprising  
2 reacting one or more members selected from the group consisting of olefins  
3 of the formula  $(R^2)(R^{2a})C=C(R^3)(R^{3a})$ , wherein  $R^2$ ,  $R^{2a}$ ,  $R^3$ , and  $R^{3a}$  are  
4 independently selected from hydrogen and  $C_1$ - $C_{10}$  alkyl; with a  
5 hydroperoxide of the formula  $R^1OOH$ , wherein  $R^1$  is  $C_1$ - $C_{10}$  alkyl; in the  
6 presence of an effective amount of a substantially solid, insoluble,  
7 heterogenous acidic catalyst; followed by separation of the reaction mixture  
8 from said catalyst.

1 9. A process according to Claim 8 for the preparation of di-*tert*-butyl  
2 peroxide comprising reacting *iso*-butylene with *tert*-butyl hydroperoxide in  
3 the presence of an effective amount of an acidic ion exchange resin catalyst.

1 10. A process according to Claim 8 for the preparation of di-*tert*-amyl  
 2 peroxide comprising reacting *tert*-amylene with *tert*-amyl hydroperoxide in  
 3 the presence of an effective amount of an acidic ion exchange resin catalyst.

1 11. A process for the preparation of a dialkyl peroxide which comprises  
 2 reacting a reactant selected from the group consisting of an alcohol having  
 3 the formula ROH, an olefin having the formula:



9 with an organic hydroperoxide having the formula R<sup>1</sup>OOH in the presence  
 10 of an effective amount of an acidic, at least 10% cross linked, ion exchange  
 11 resin catalyst, R and R<sup>1</sup> being alkyl groups having to 10 carbon atoms, and  
 12 R<sup>2</sup> and R<sup>3</sup> being hydrogen or R.

1 12. A process for the preparation of ditertiary butyl peroxide which  
 2 comprises reacting a reactant selected from the group consisting of tertiary  
 3 butyl alcohol, isobutylene, and mixtures with tertiary butyl hydroperoxide  
 4 in the presence of an effective amount of an acidic, at least 10% cross-linked  
 5 ion exchange resin catalyst.

1 13. A process for the preparation of ditertiary amyl peroxide which  
 2 comprises reacting a reactant selected from the group consisting of tertiary  
 3 amyl alcohol, tertiary amylene, and mixtures with tertiary amyl  
 4 hydroperoxide in the presence of an effective amount of an acidic, at least  
 5 10% cross-linked ion exchange resin catalyst.

1 14. The process of claim 11 wherein the said resin is at least 20% cross-  
2 linked polystyrene-divinyl benzene acidic resin.

1 15. A process for the preparation of a dialkyl peroxide which comprises  
2 reacting an olefin having the formula:



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8 with an organic hydroperoxide having the formula  $\text{R}^1\text{OOH}$  in the presence  
9 of an effective amount of an acidic ion exchange resin catalyst,  $\text{R}^2$  and  $\text{R}^3$   
10 being hydrogen or  $\text{R}$ ,  $\text{R}$  and  $\text{R}^1$  being alkyl groups having to 10 carbon  
11 atoms.

1 16. A process for the preparation of ditertiary butyl peroxide which  
2 comprises reacting isobutylene with tertiary butyl hydroperoxide in the  
3 presence of an effective amount of an acidic ion exchange resin catalyst.

1 17. A process for the preparation of ditertiary amyl peroxide which  
2 comprises reacting tertiary amylene with tertiary amyl hydroperoxide in the  
3 presence of an effective amount of an acidic ion exchange resin catalyst.

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